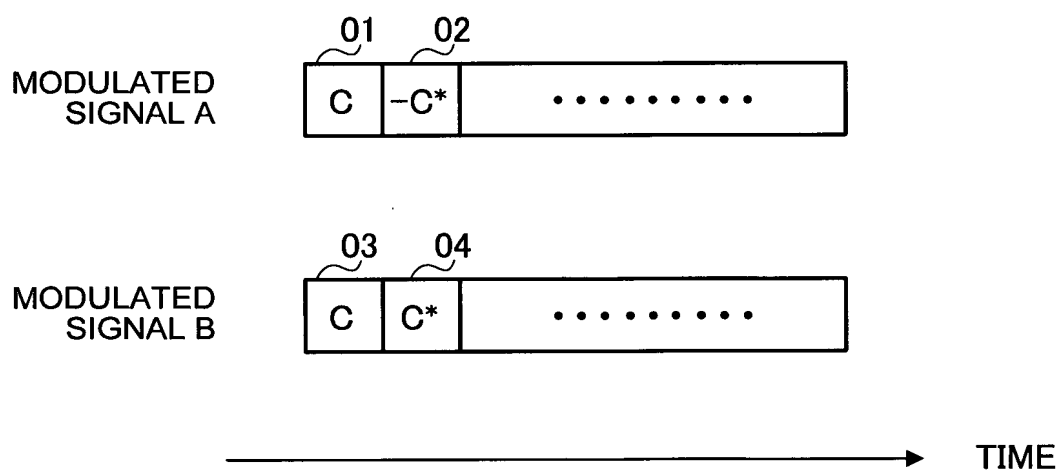


(PRIOR ART)  
FIG.1



(PRIOR ART)  
FIG.2

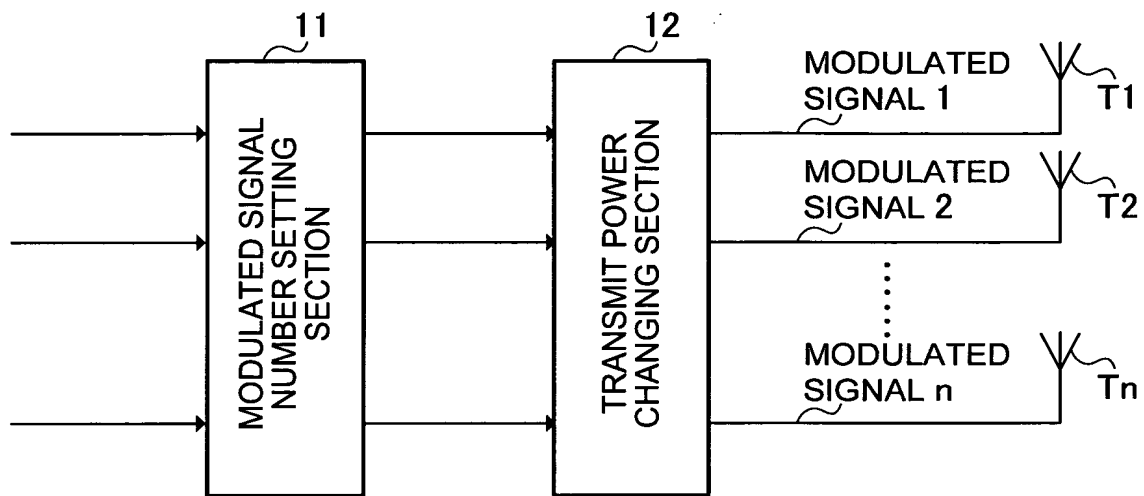
10 RADIO TRANSMITTING APPARATUS

FIG.3

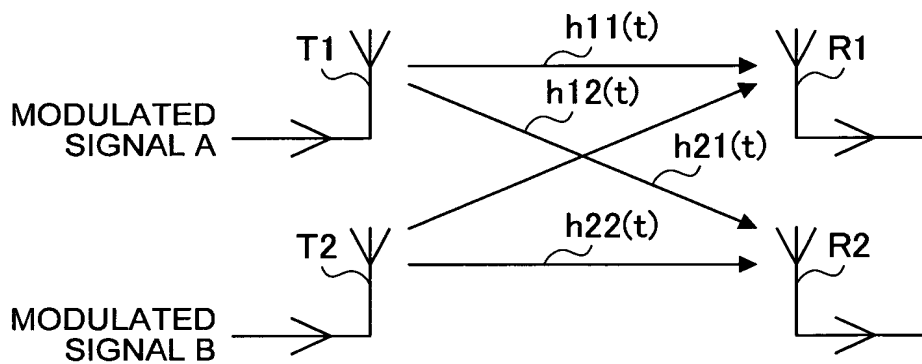


FIG.4

FIG.5A

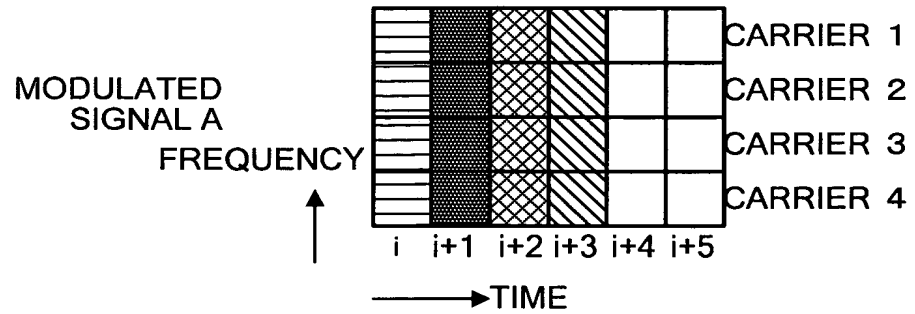
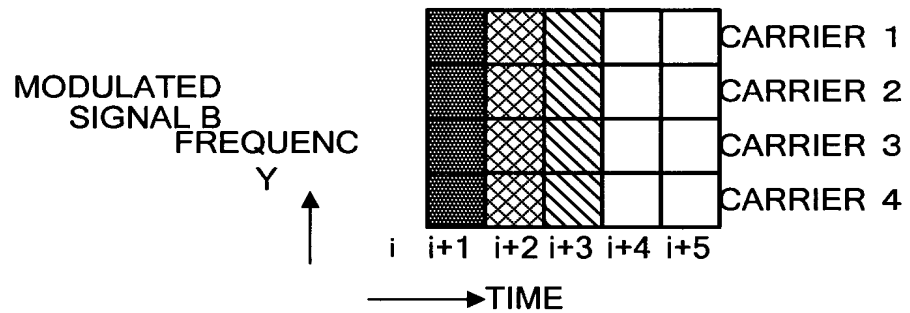







FIG.5B



- |   |   |                 |
|---|---|-----------------|
|  | 101: SIGNAL DETECTION SYMBOL                              | } PILOT SYMBOLS |
|  | 102: CONTROL SYMBOL                                       |                 |
|  | 103: TRANSMISSION METHOD INFORMATION SYMBOL               |                 |
|  | 104: RADIO WAVE PROPAGATION ENVIRONMENT ESTIMATION SYMBOL |                 |
|  | 105: DATA SYMBOL  |                 |

4/33

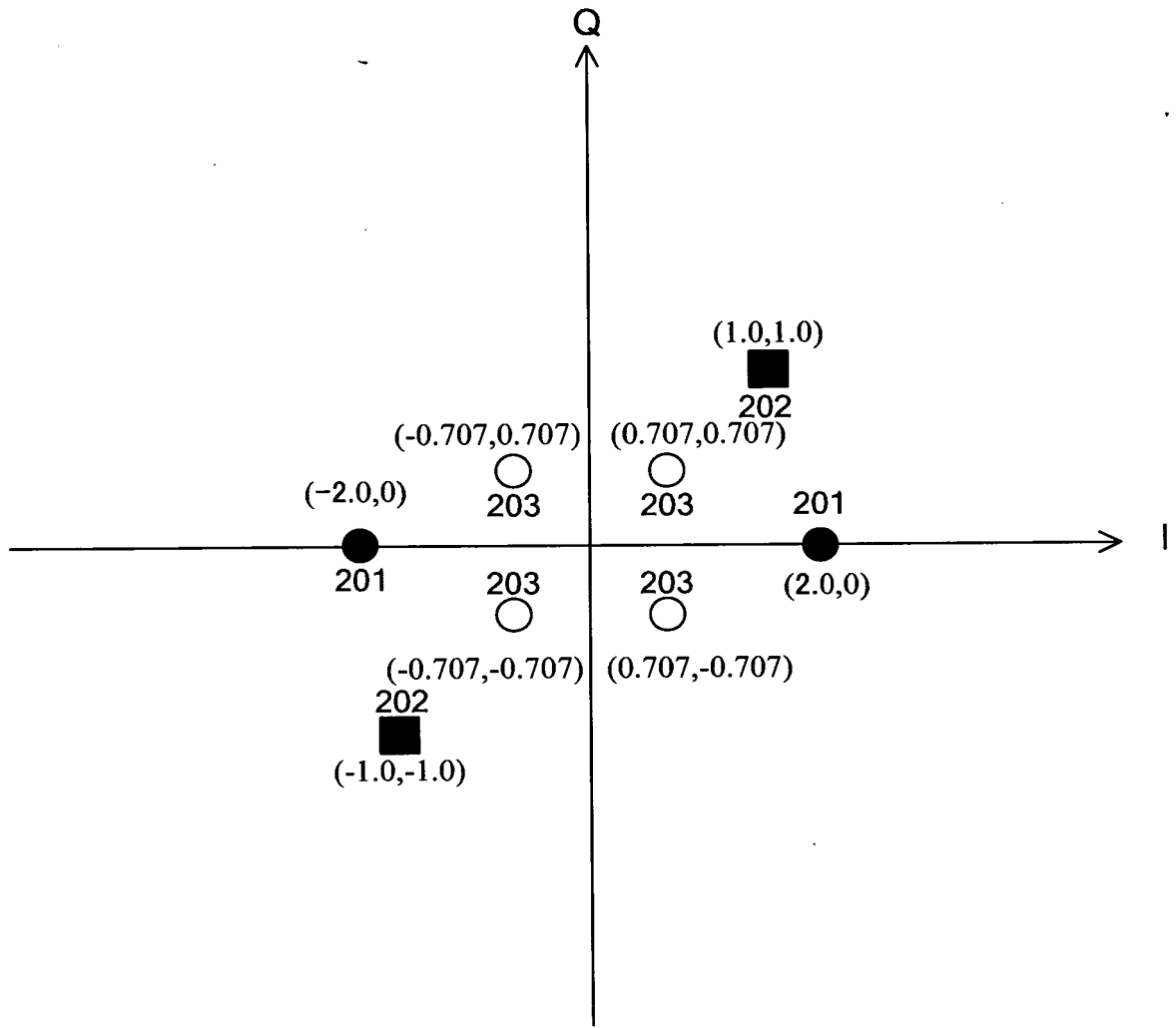


FIG.6

MODULATED SIGNAL A

| TIME | CARRIER 1 |      | CARRIER 2 |      | CARRIER 3 |      | CARRIER 4 |      |
|------|-----------|------|-----------|------|-----------|------|-----------|------|
|      | I         | Q    | I         | Q    | I         | Q    | I         | Q    |
| i    | 2.0       | 0    | 0         | 0    | -2.0      | 0    | 0         | 0    |
| ii   | 1.0       | 1.0  | -1.0      | -1.0 | -1.0      | -1.0 | 1.0       | 1.0  |
| 3    | -1.0      | -1.0 | 1.0       | 1.0  | 1.0       | 1.0  | -1.0      | -1.0 |

FIG.7A

MODULATED SIGNAL B

| TIME | CARRIER 1 |      | CARRIER 2 |      | CARRIER 3 |      | CARRIER 4 |      |
|------|-----------|------|-----------|------|-----------|------|-----------|------|
|      | I         | Q    | I         | Q    | I         | Q    | I         | Q    |
| i    |           |      |           |      |           |      |           |      |
| ii   | -1.0      | -1.0 | 1.0       | 1.0  | -1.0      | -1.0 | 1.0       | 1.0  |
| 3    | 1.0       | 1.0  | -1.0      | -1.0 | 1.0       | 1.0  | -1.0      | -1.0 |

FIG.7B

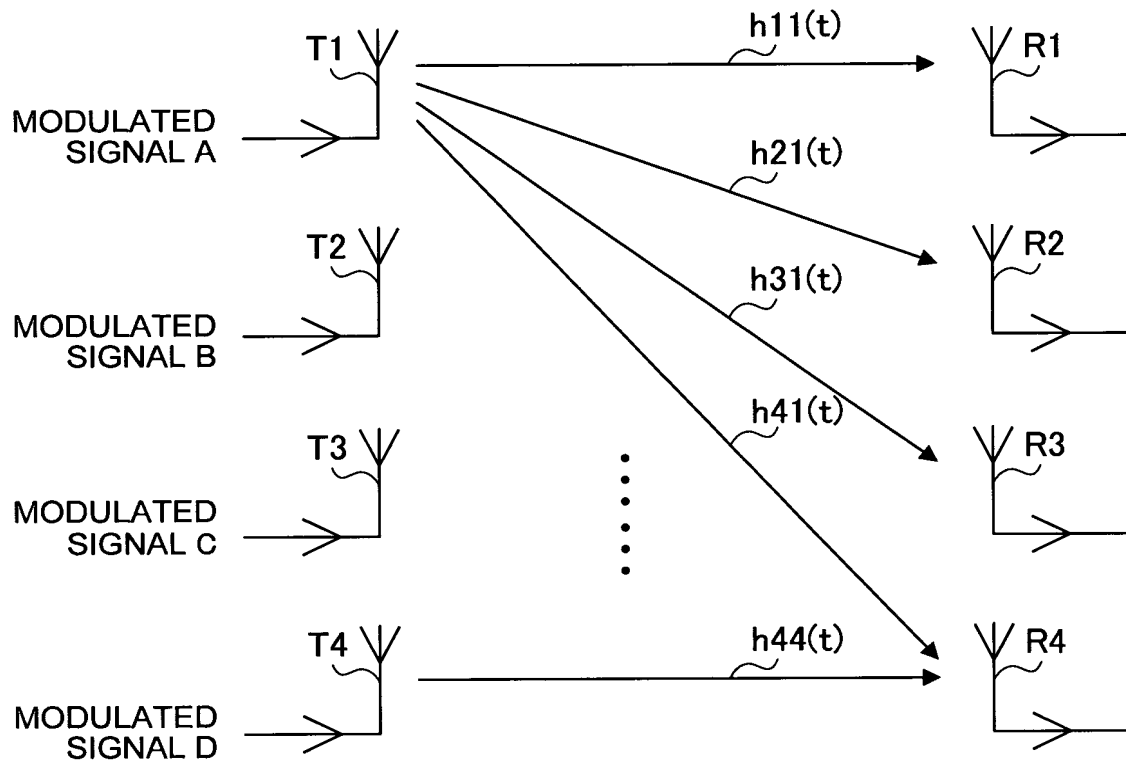


FIG.8

FIG.9A

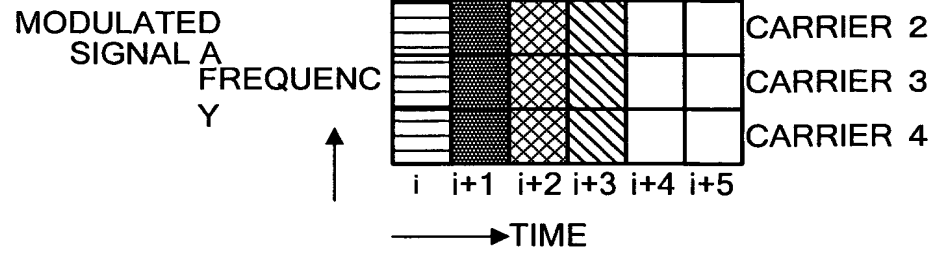


FIG.9B

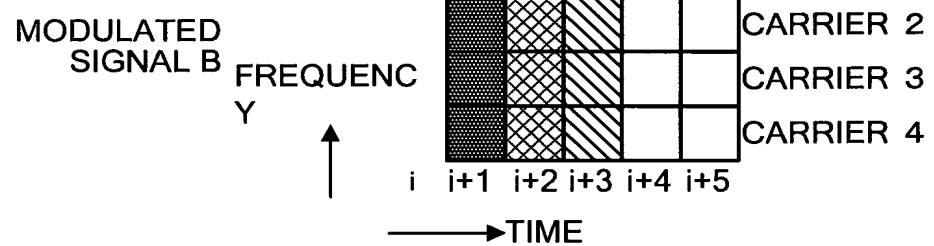


FIG.9C

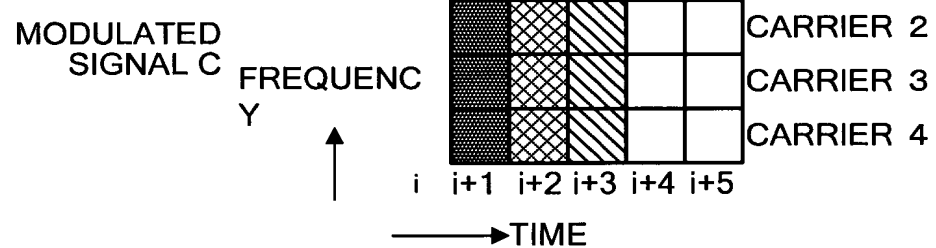
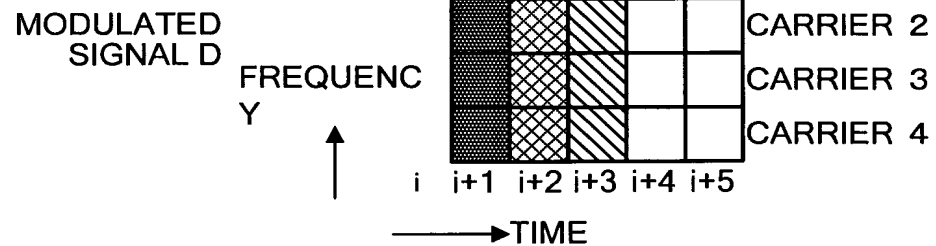







FIG.9D



- |   |  |                 |
|---|--|-----------------|
|  | 101: SIGNAL DETECTION SYMBOL                                 | } PILOT SYMBOLS |
|  | 102: CONTROL SYMBOL  |                 |
|  | 103: TRANSMISSION METHOD<br>INFORMATION SYMBOL               |                 |
|  | 104: RADIO WAVE PROPAGATION<br>ENVIRONMENT ESTIMATION SYMBOL |                 |
|  | 105: DATA SYMBOL   |                 |

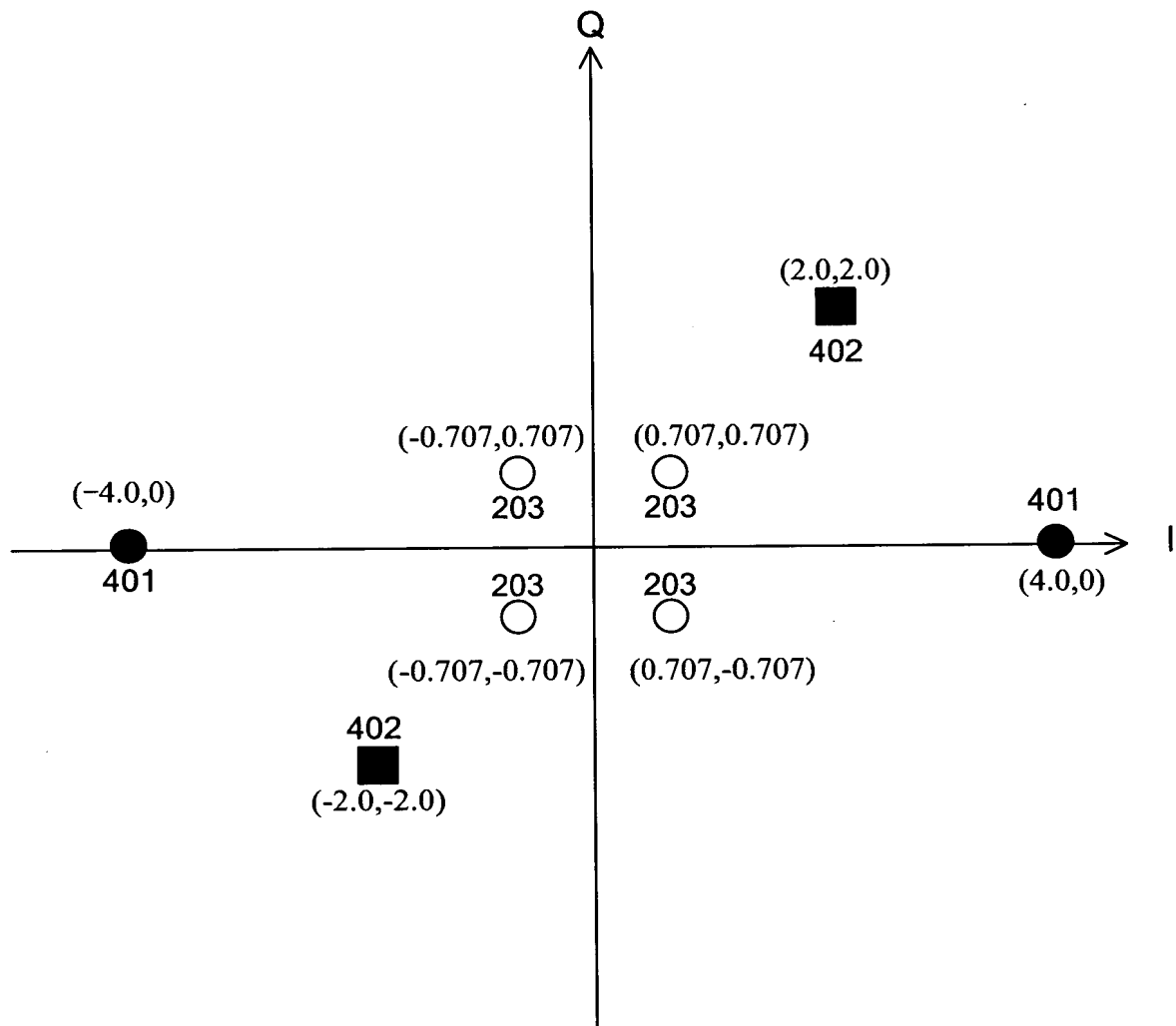


FIG.10



MODULATED SIGNAL A

| TIM | CARRIER 1 |      | CARRIER 2 |      | CARRIER 3 |      | CARRIER 4 |      |
|-----|-----------|------|-----------|------|-----------|------|-----------|------|
|     | I         | Q    | I         | Q    | I         | Q    | I         | Q    |
| E   | 4.0       | 0    | 0         | 0    | -4.0      | 0    | 0         | 0    |
| i+1 | 2.0       | 2.0  | -2.0      | -2.0 | -2.0      | -2.0 | 2.0       | 2.0  |
| i+3 | -2.0      | -2.0 | 2.0       | 2.0  | 2.0       | 2.0  | -2.0      | -2.0 |

FIG.11A

MODULATED SIGNAL B

| TIM | CARRIER 1 |      | CARRIER 2 |      | CARRIER 3 |      | CARRIER 4 |      |
|-----|-----------|------|-----------|------|-----------|------|-----------|------|
|     | I         | Q    | I         | Q    | I         | Q    | I         | Q    |
| E   |           |      |           |      |           |      |           |      |
| i+1 | -2.0      | -2.0 | 2.0       | 2.0  | -2.0      | -2.0 | 2.0       | 2.0  |
| i+3 | 2.0       | 2.0  | -2.0      | -2.0 | 2.0       | 2.0  | -2.0      | -2.0 |

FIG.11B

MODULATED SIGNAL C

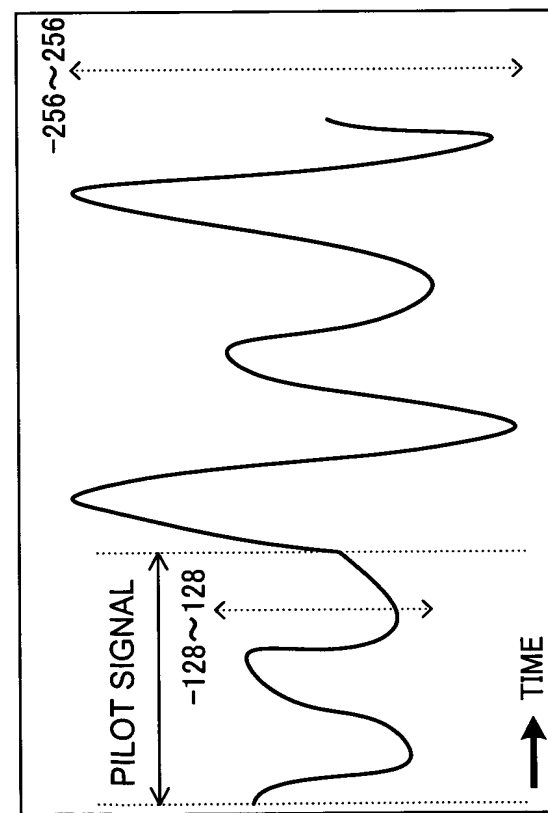
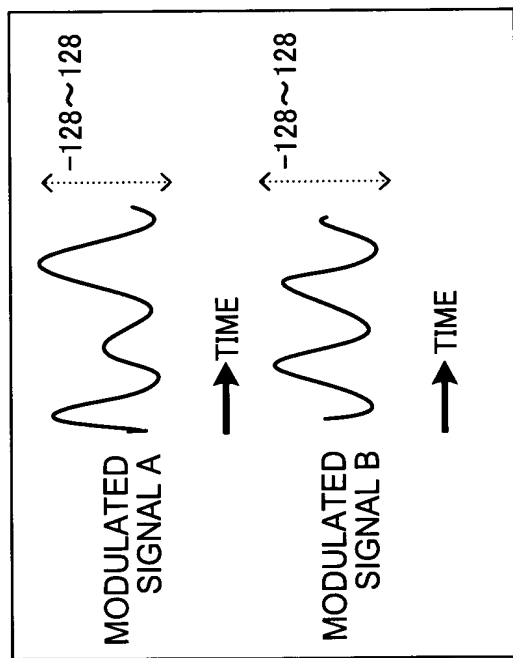
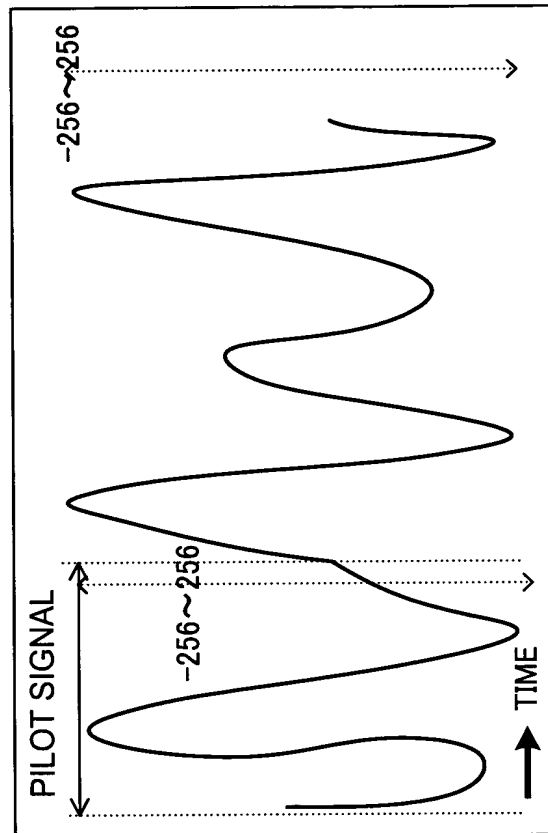
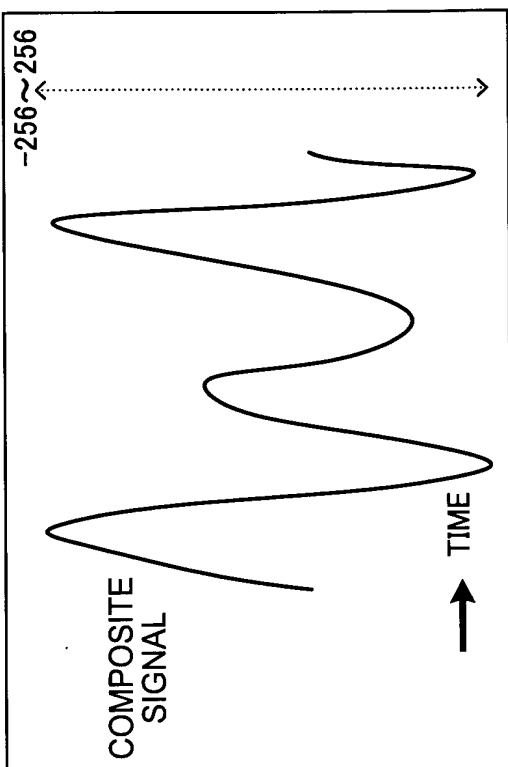
| TIM | CARRIER 1 |      | CARRIER 2 |      | CARRIER 3 |      | CARRIER 4 |      |
|-----|-----------|------|-----------|------|-----------|------|-----------|------|
|     | I         | Q    | I         | Q    | I         | Q    | I         | Q    |
| E   |           |      |           |      |           |      |           |      |
| i+1 | 2.0       | 2.0  | -2.0      | -2.0 | -2.0      | -2.0 | 2.0       | 2.0  |
| i+3 | -2.0      | -2.0 | 2.0       | 2.0  | 2.0       | 2.0  | -2.0      | -2.0 |

FIG.11C

MODULATED SIGNAL D

| TIM | CARRIER 1 |      | CARRIER 2 |      | CARRIER 3 |      | CARRIER 4 |      |
|-----|-----------|------|-----------|------|-----------|------|-----------|------|
|     | I         | Q    | I         | Q    | I         | Q    | I         | Q    |
| E   |           |      |           |      |           |      |           |      |
| i+1 | -2.0      | -2.0 | 2.0       | 2.0  | -2.0      | -2.0 | 2.0       | 2.0  |
| i+3 | 2.0       | 2.0  | -2.0      | -2.0 | 2.0       | 2.0  | -2.0      | -2.0 |

FIG.11D



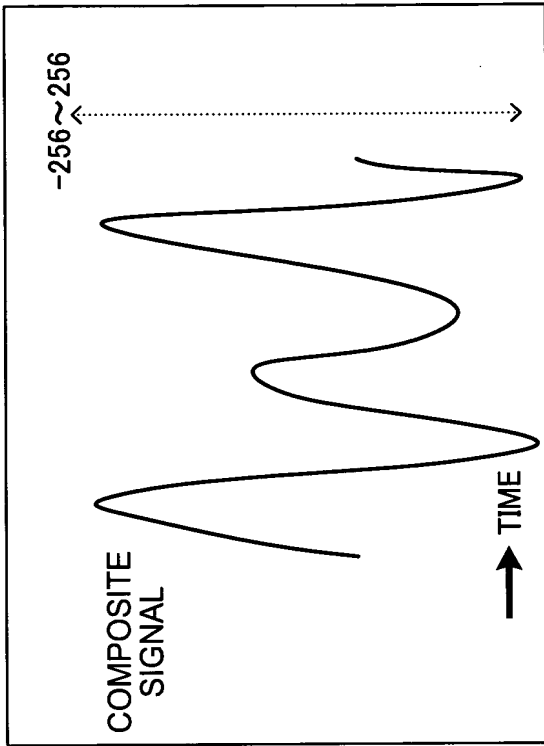
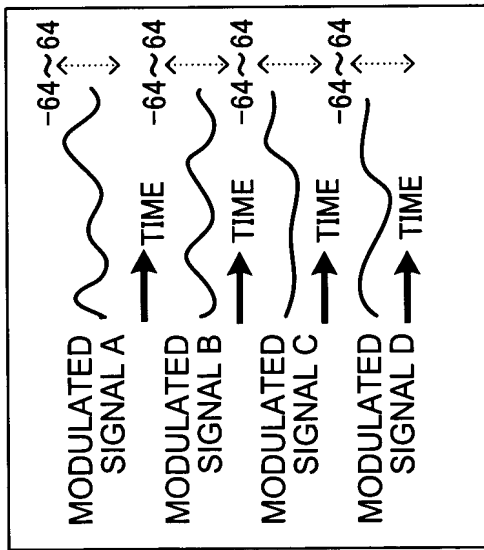


FIG. 13B

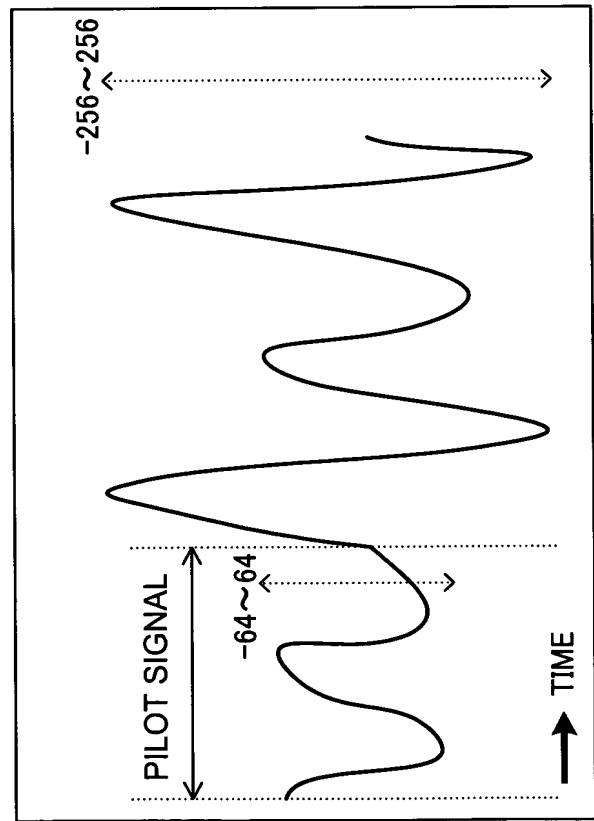


FIG. 13C

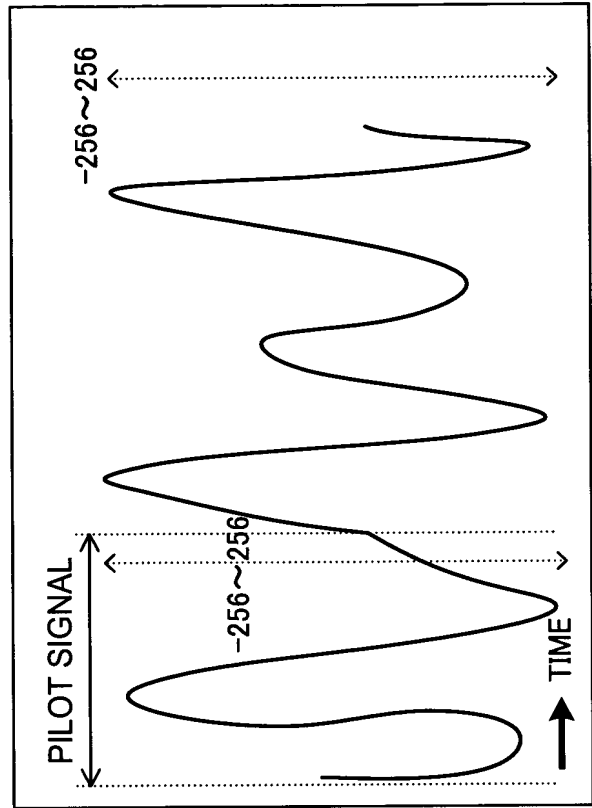


FIG. 13D

500 RADIO TRANSMITTING APPARATUS

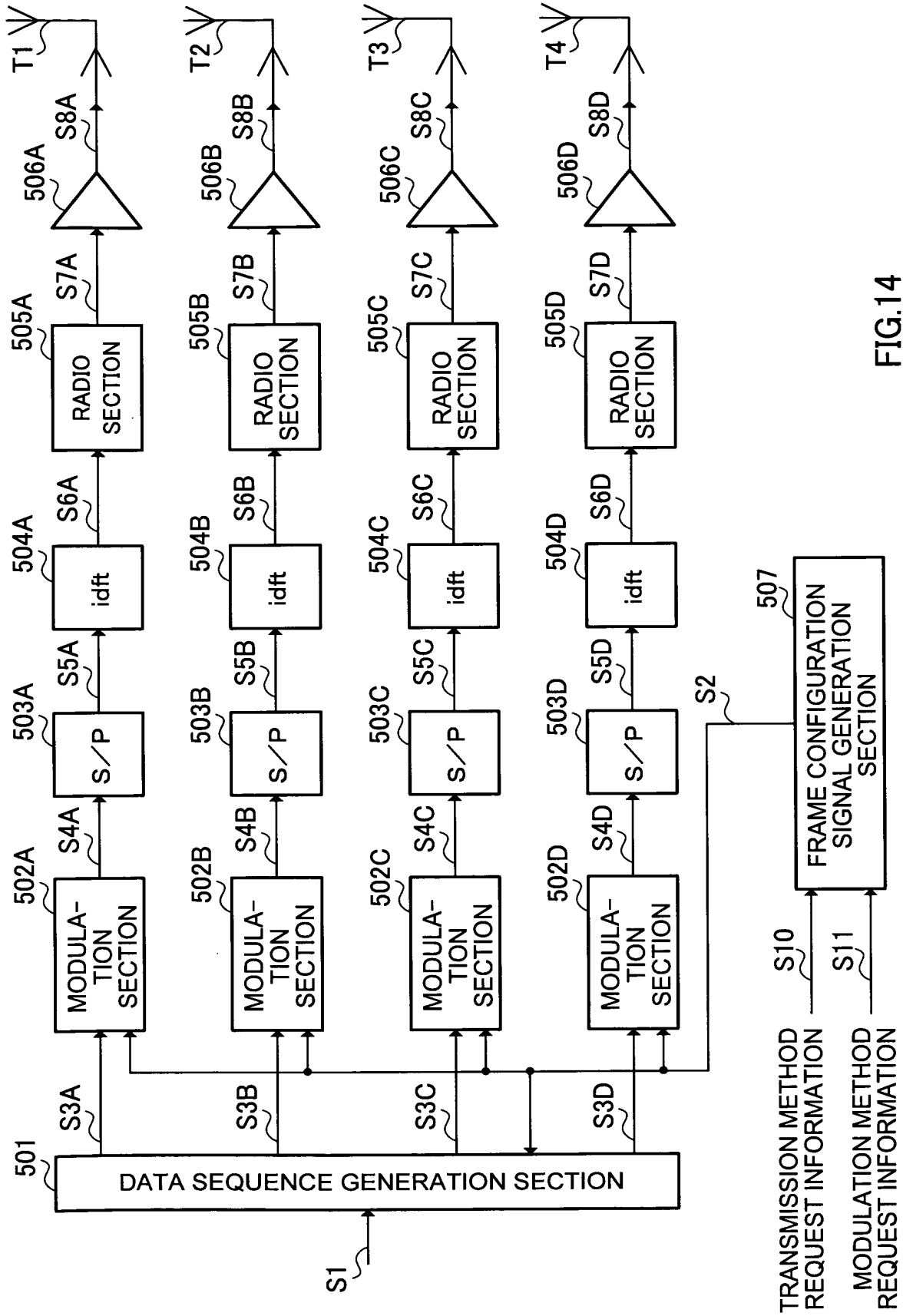


FIG.14

502A (502B~502D)  
MODULATION SECTION

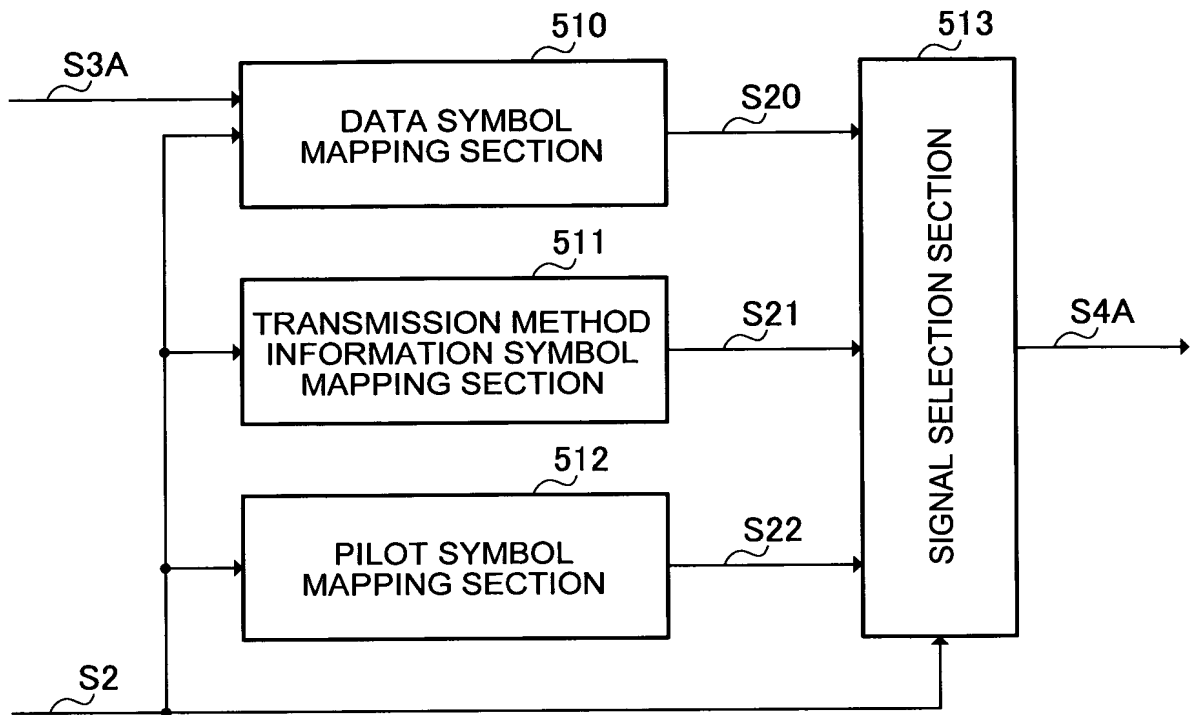


FIG.15

512 PILOT SYMBOL MAPPING SECTION

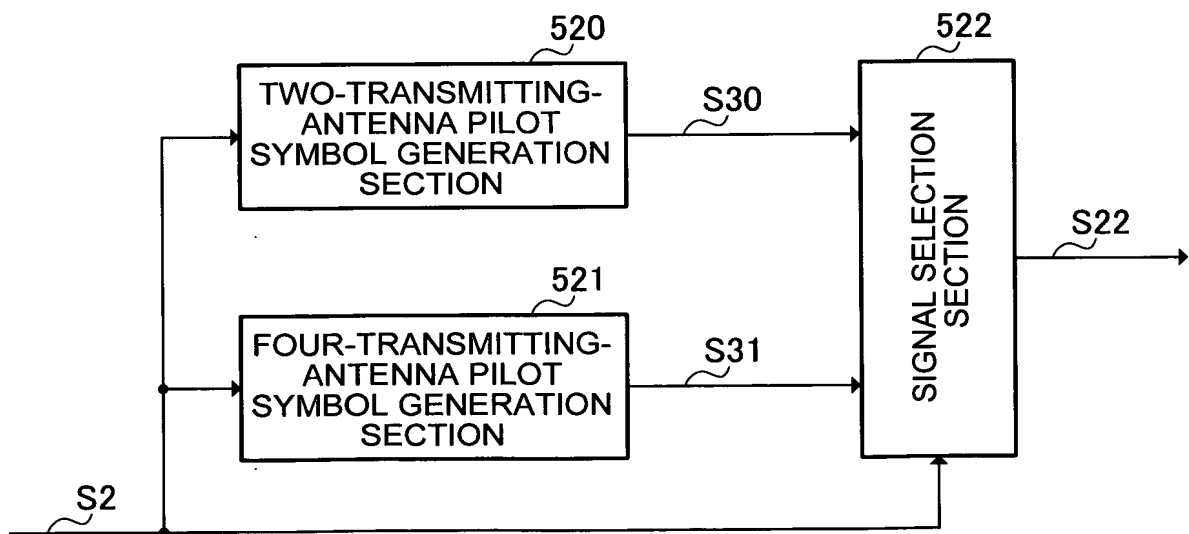


FIG.16

# 600 RADIO RECEIVING APPARATUS

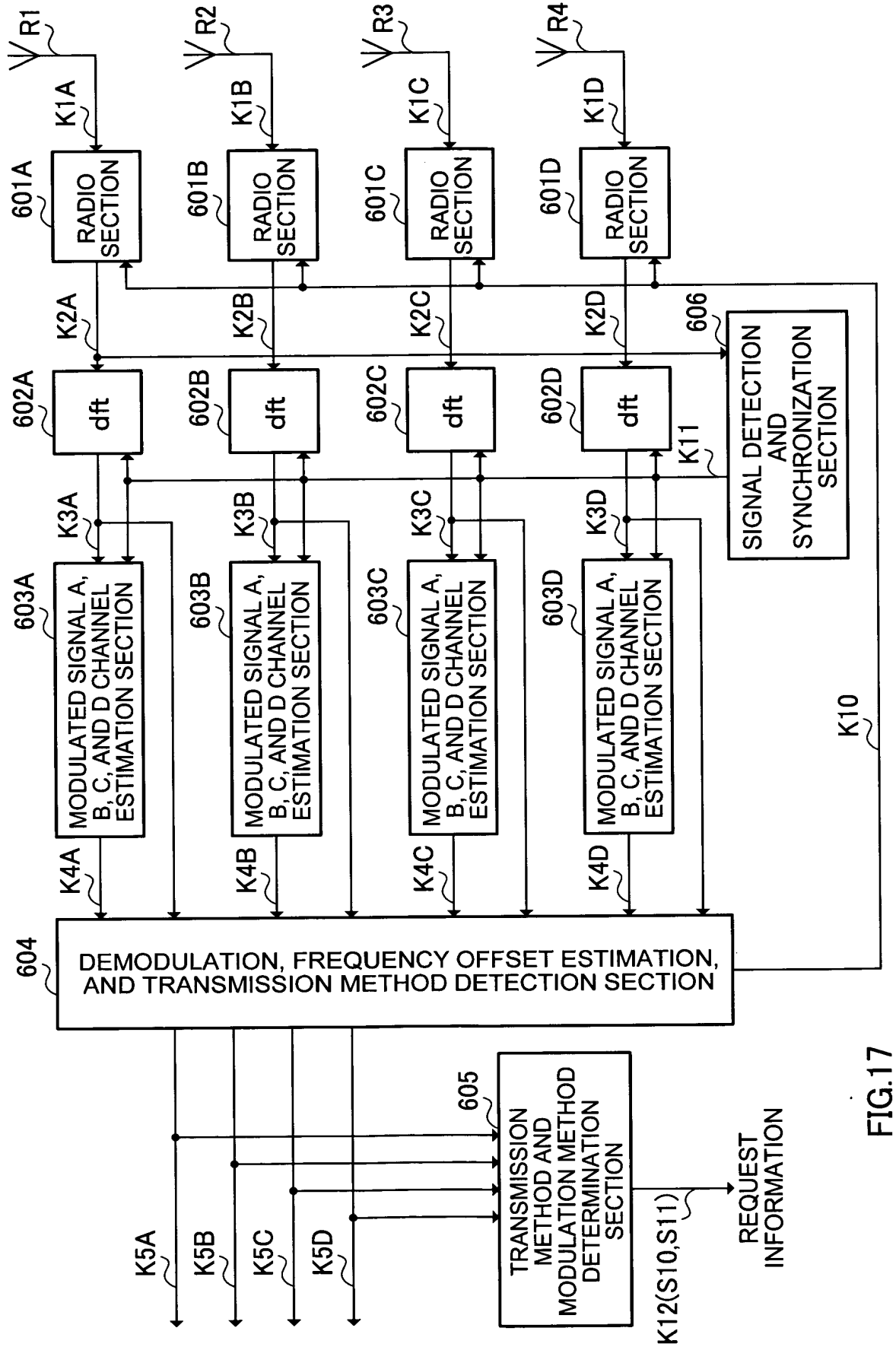


FIG.17

601A (601B~601D) RADIO SECTION

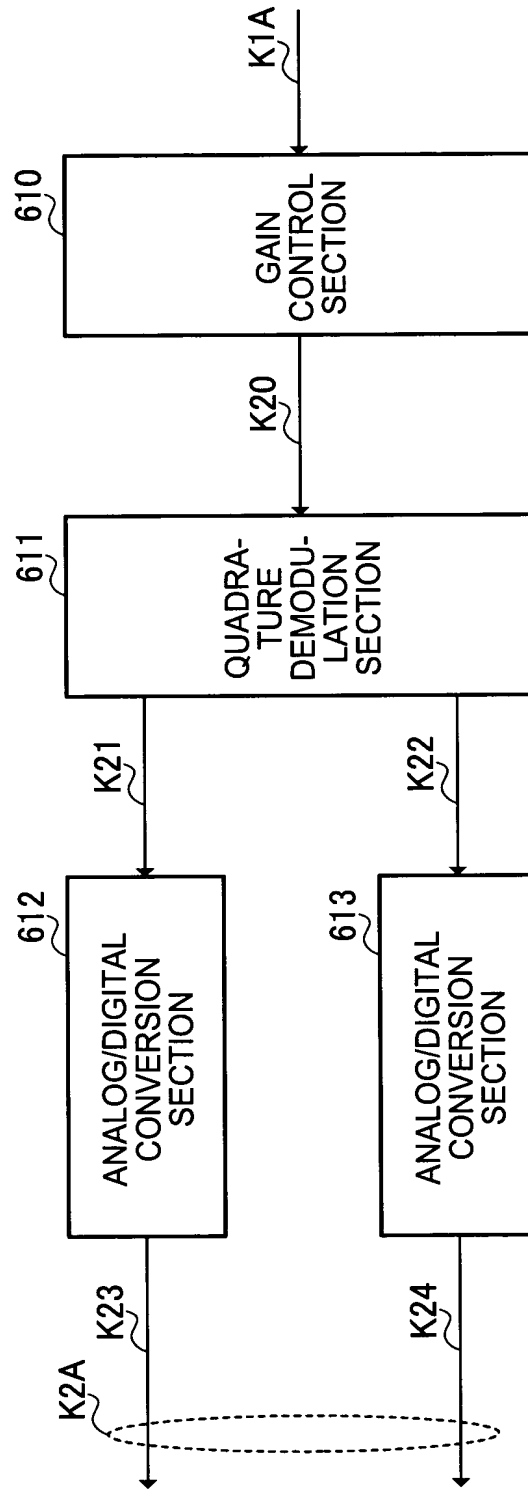


FIG.18

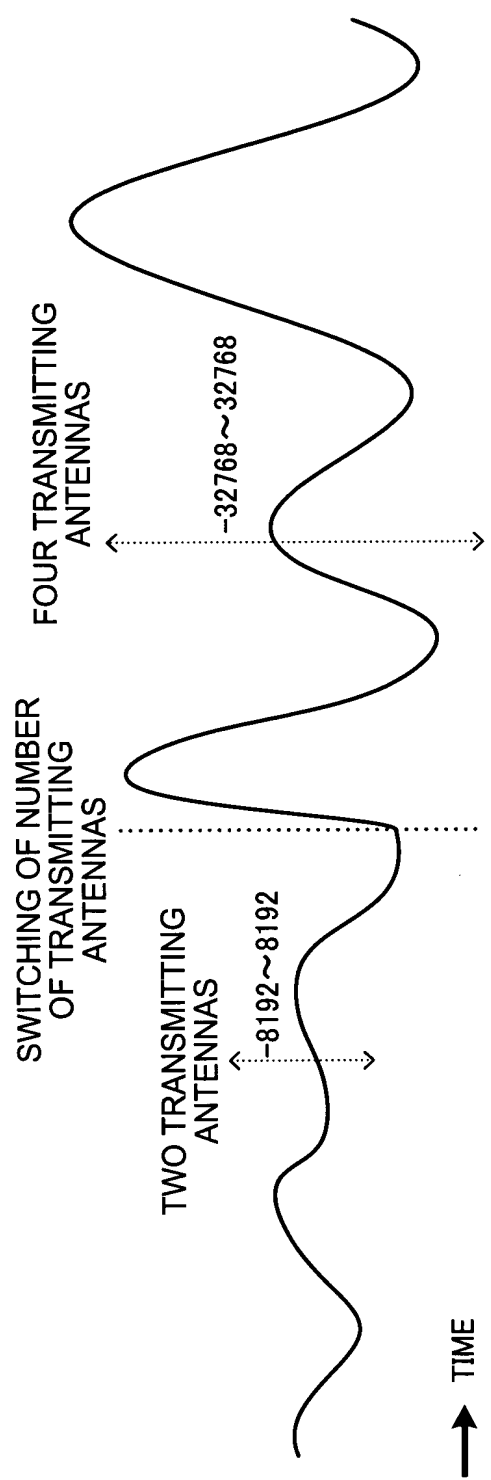


FIG.19



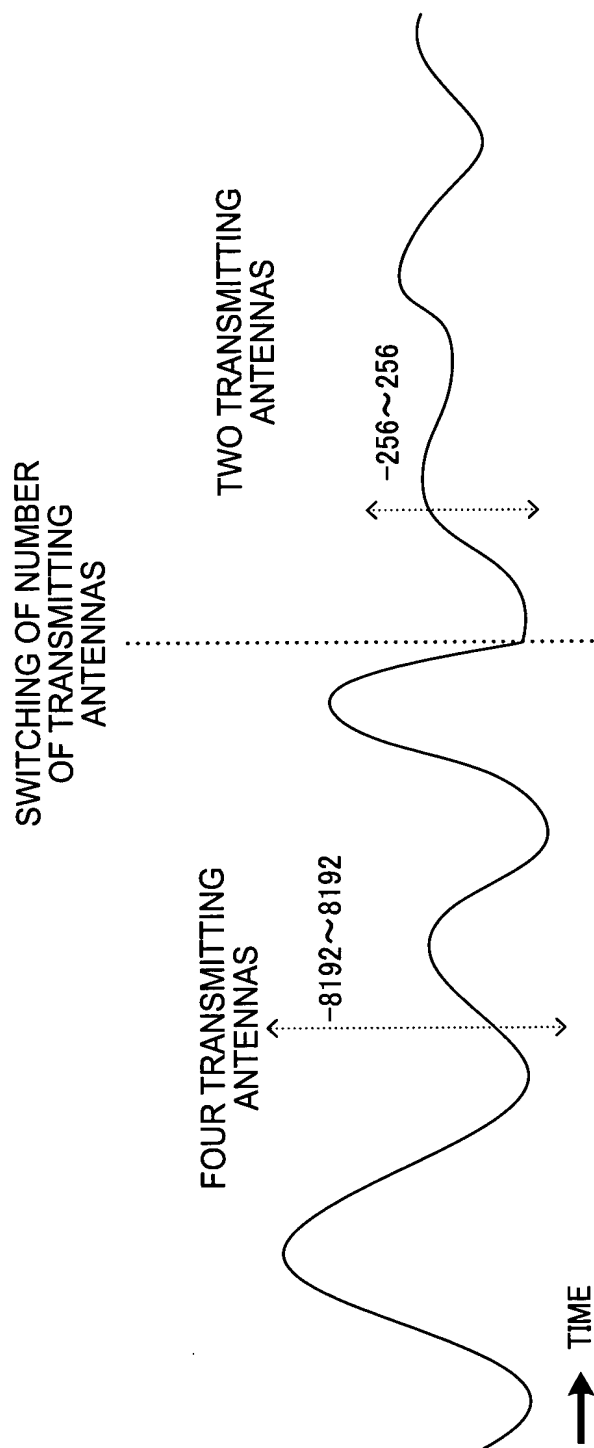


FIG.20

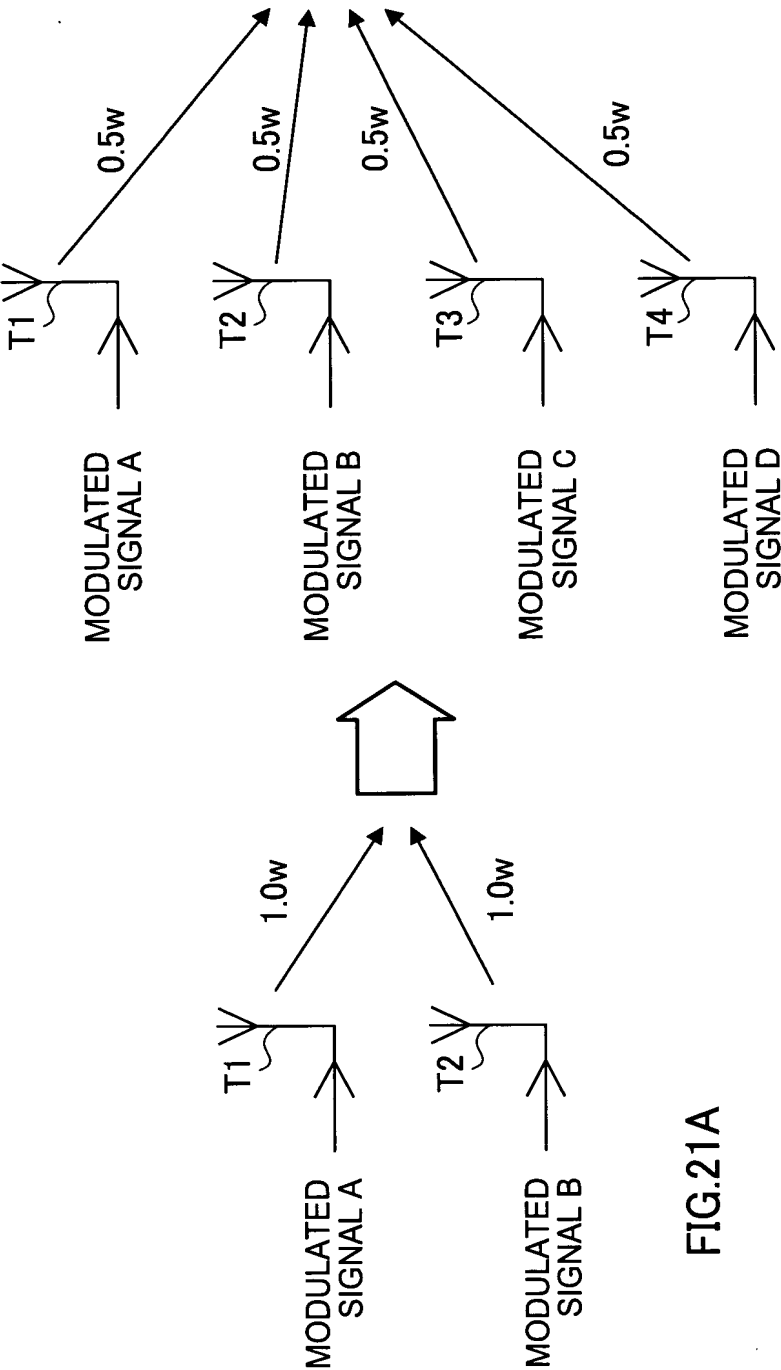


FIG.21B

FIG.21A

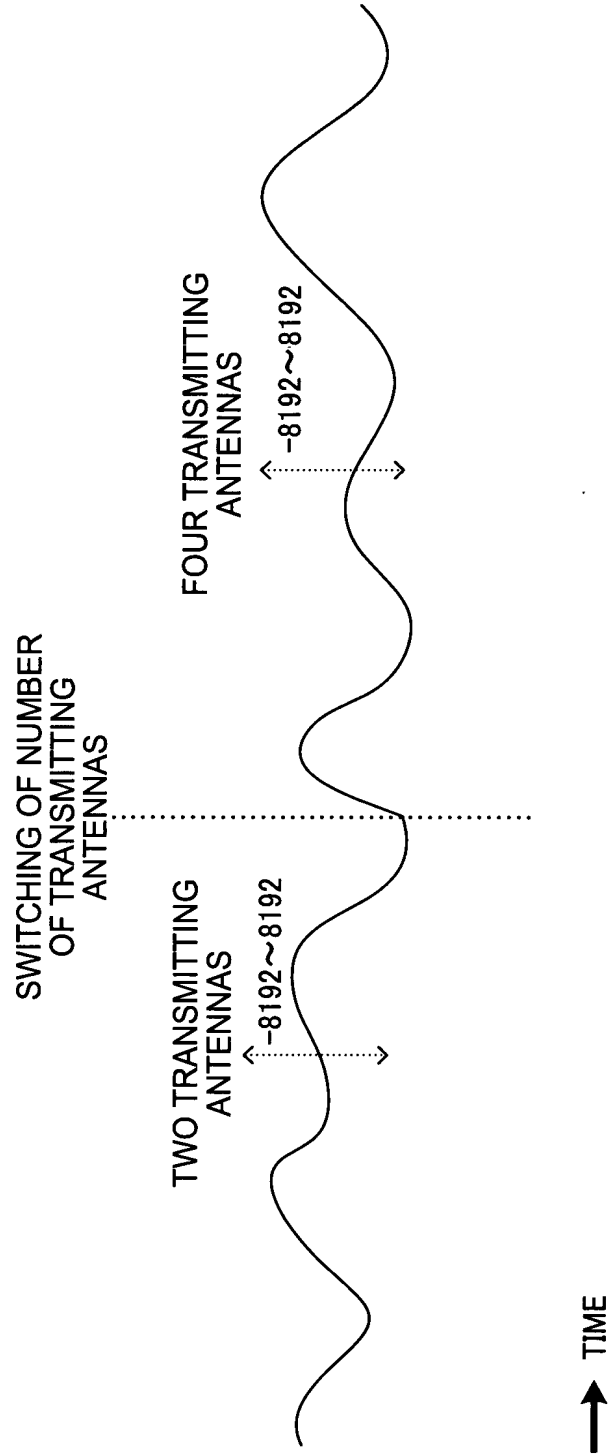


FIG.22

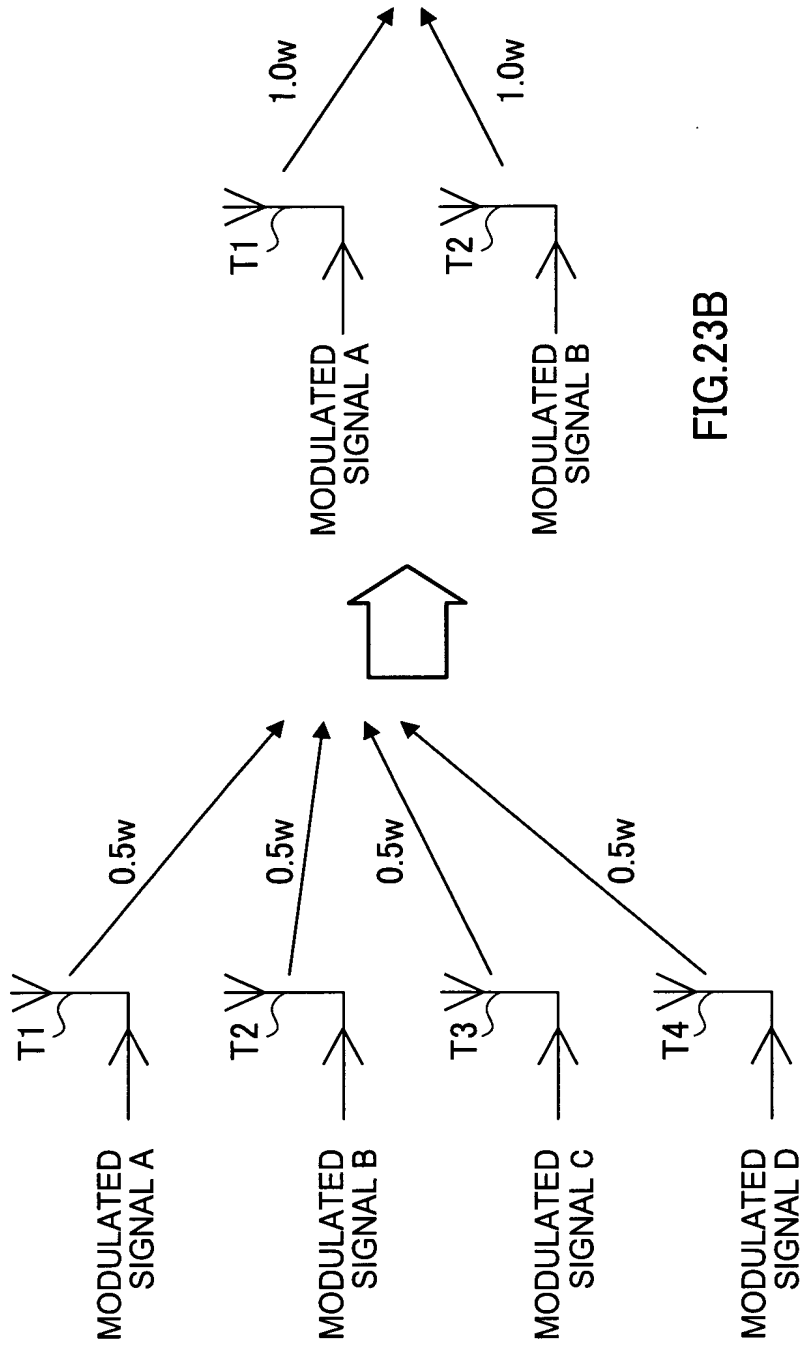


FIG.23B

FIG.23A

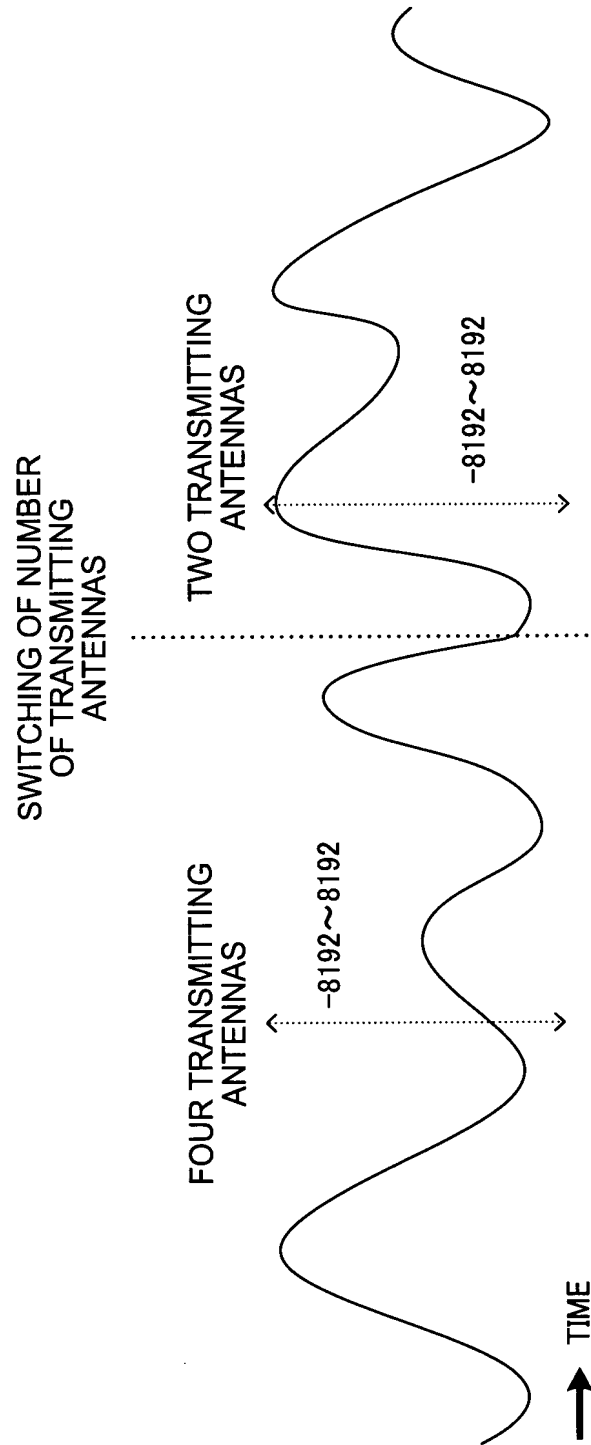


FIG.24

| SWITCHING OF NUMBER OF TRANSMITTING ANTENNAS |                                 |  |                                  |        |
|--|---------------------------------|--|----------------------------------|--------|
|  | TWO<br>TRANSMITTING<br>ANTENNAS |  | FOUR<br>TRANSMITTING<br>ANTENNAS |        |
| TRANSMITTING<br>ANTENNA T1                   | 1.00W                           |  | 0. 5W    0. 75W                  | 1. 00W |
| TRANSMITTING<br>ANTENNA T2                   | 1.00W                           |  | 0. 5W    0. 75W                  | 1. 00W |
| TRANSMITTING<br>ANTENNA T3                   |                                 |  | 0. 5W    0. 75W                  | 1. 00W |
| TRANSMITTING<br>ANTENNA T4                   |                                 |  | 0. 5W    0. 75W                  | 1. 00W |

→ TIME

FIG.25

| SWITCHING OF NUMBER OF TRANSMITTING ANTENNAS |                                  |  |                                 |       |
|--|----------------------------------|--|---------------------------------|-------|
|  | FOUR<br>TRANSMITTING<br>ANTENNAS |  | TWO<br>TRANSMITTING<br>ANTENNAS |       |
| TRANSMITTING<br>ANTENNA T1                   | 0. 5W                            |  | 1. 0W    0. 75W                 | 0. 5W |
| TRANSMITTING<br>ANTENNA T2                   | 0. 5W                            |  | 1. 0W    0. 75W                 | 0. 5W |
| TRANSMITTING<br>ANTENNA T3                   | 0. 5W                            |  |                                 |       |
| TRANSMITTING<br>ANTENNA T4                   | 0. 5W                            |  |                                 |       |

→ TIME

FIG.26

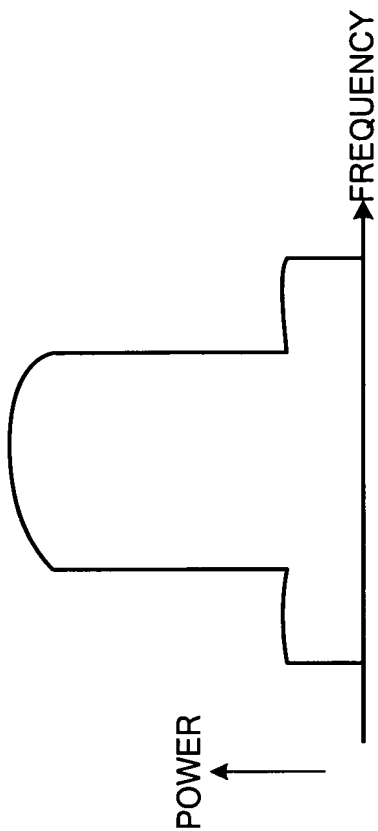


FIG.27B

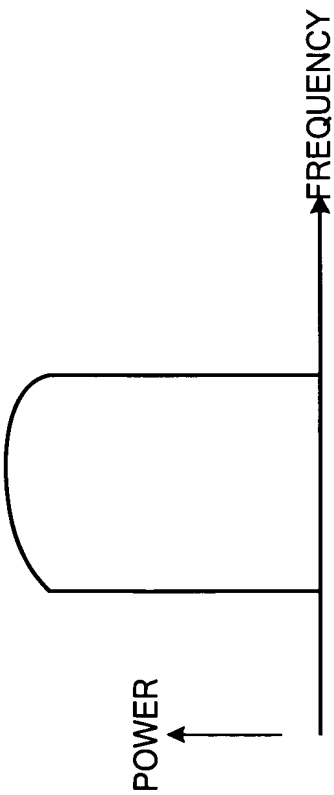


FIG.27A

## 700 RADIO TRANSMITTING APPARATUS

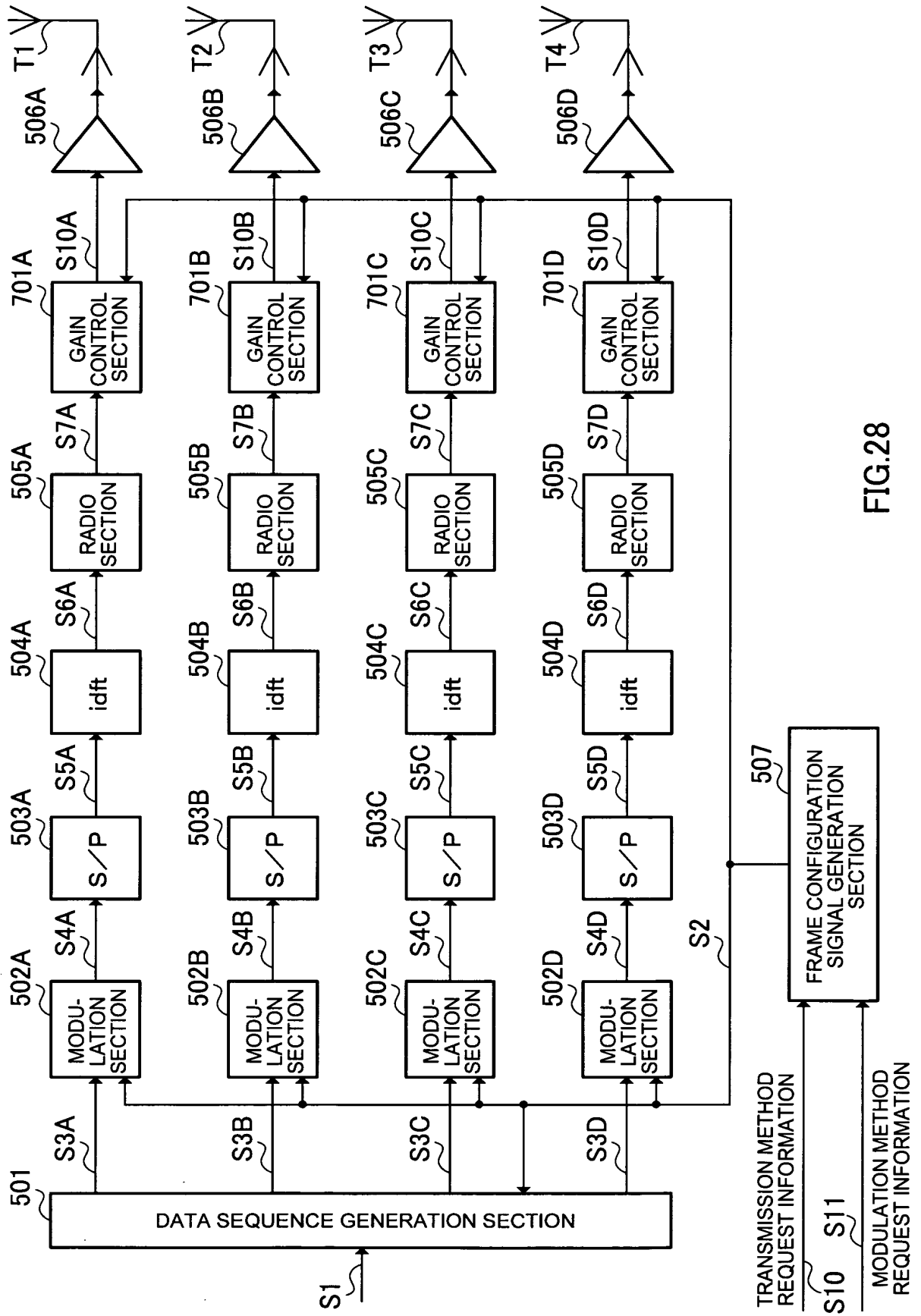


FIG.28



FIG.29A

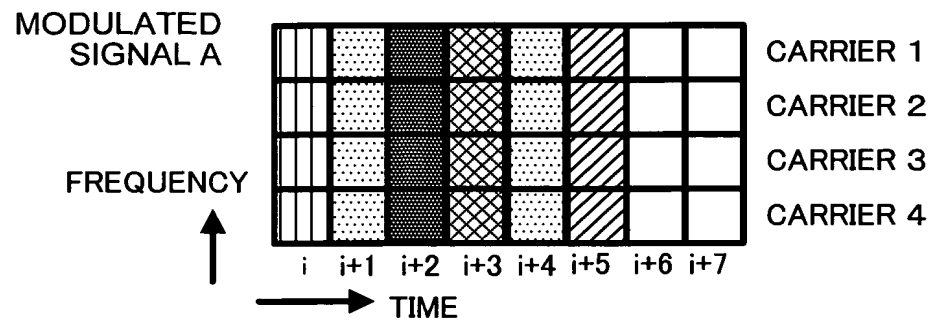


FIG.29B

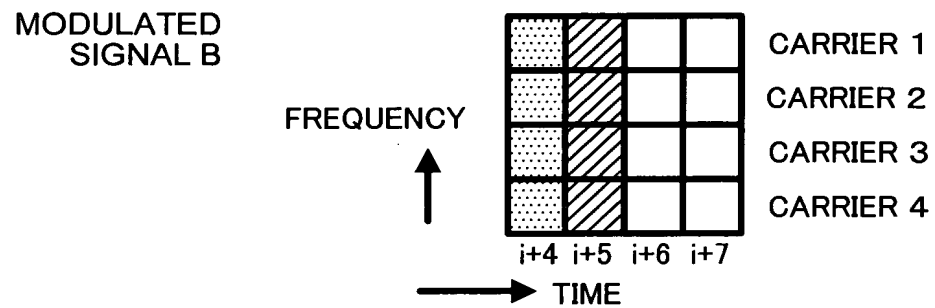


FIG.29C

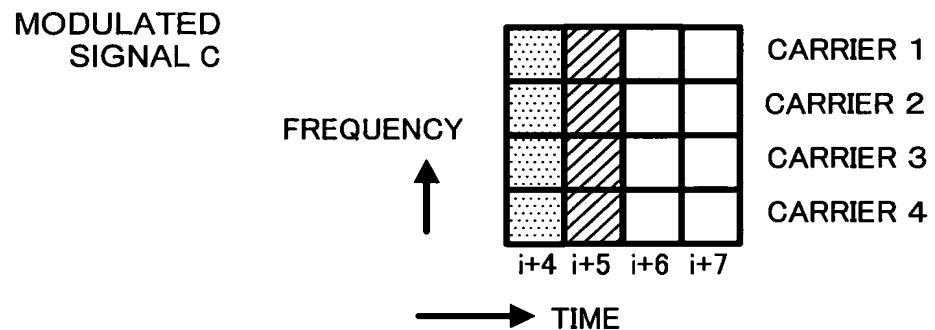
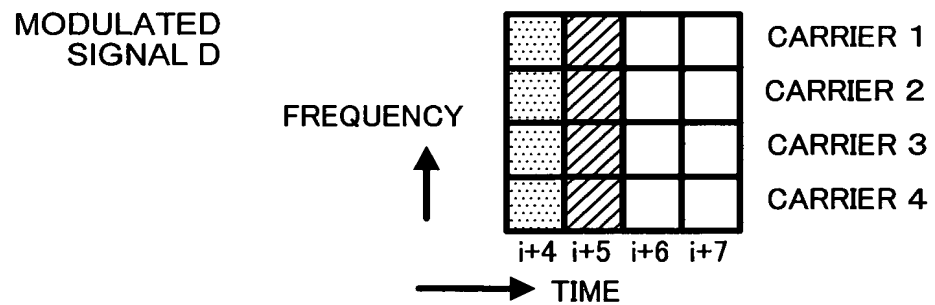








FIG.29D



-  2701: SIGNAL DETECTION SYMBOL
  -  2702: GAIN CONTROL SYMBOL
  -  2703: FREQUENCY OFFSET ESTIMATION SYMBOL
  -  2704: TRANSMISSION METHOD INFORMATION SYMBOL
  -  2705: RADIO WAVE PROPAGATION ENVIRONMENT ESTIMATION SYMBOL
  -  2706: DATA SYMBOL
- PILOT SYMBOLS

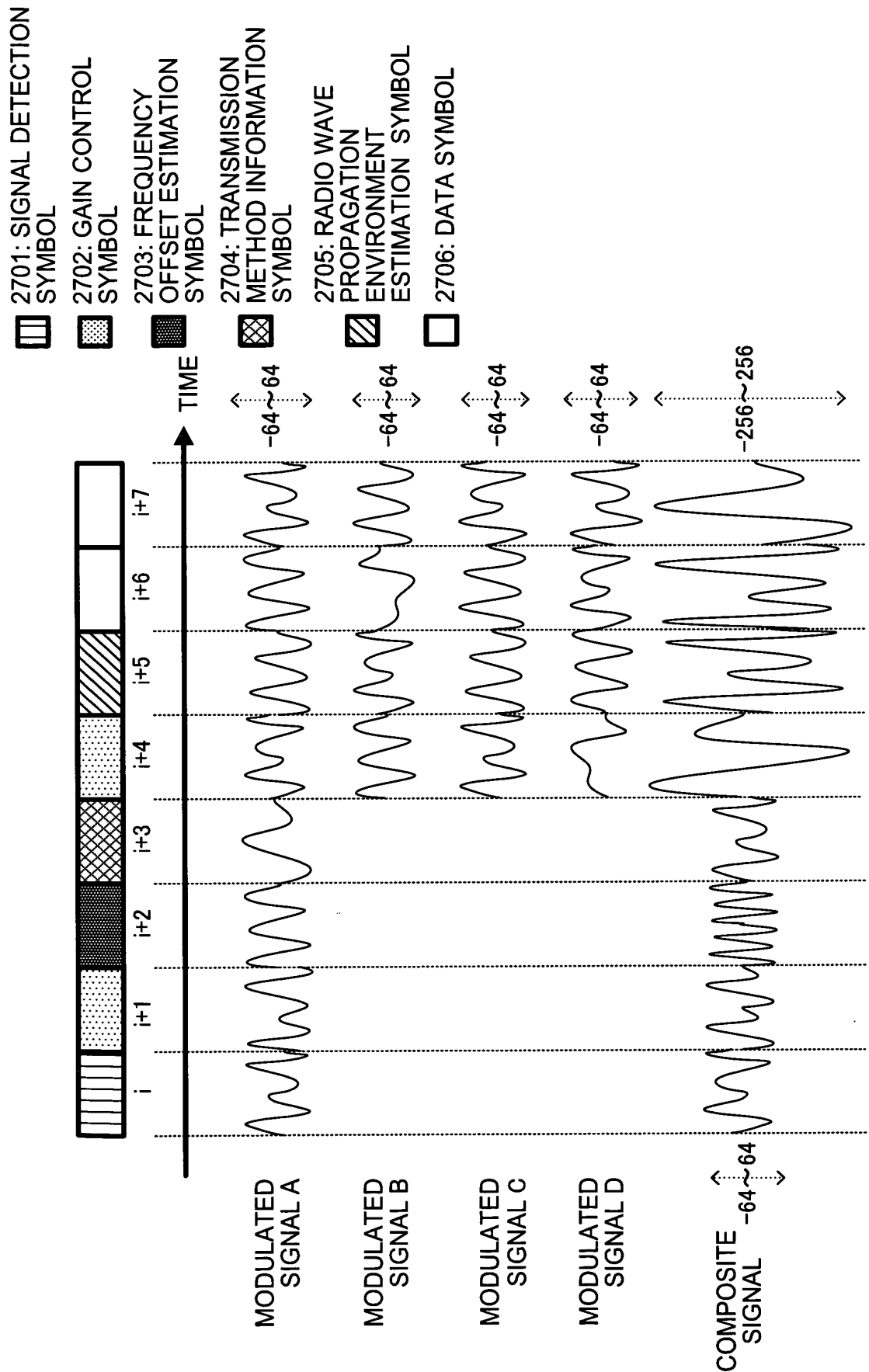


FIG.30

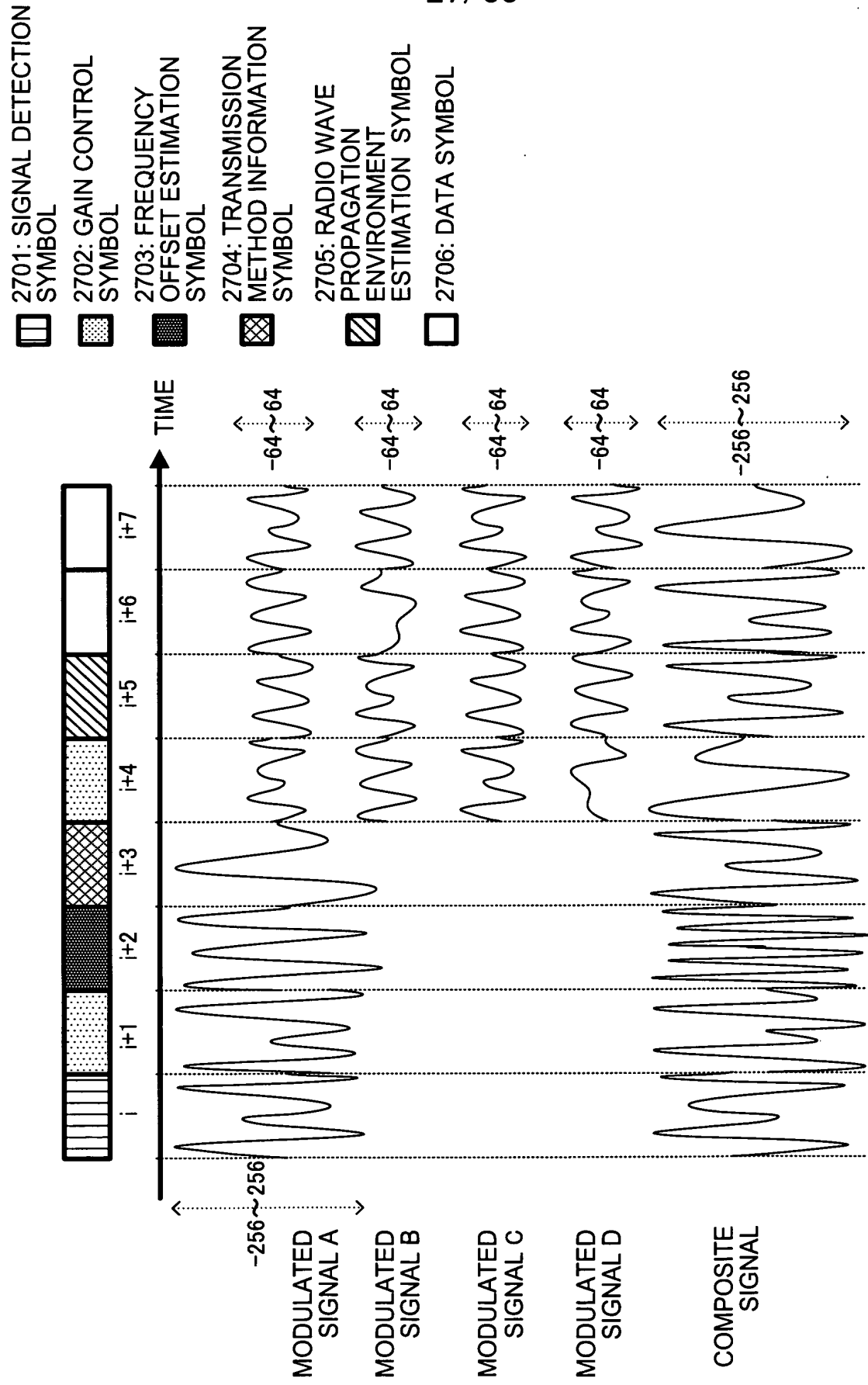


FIG.31

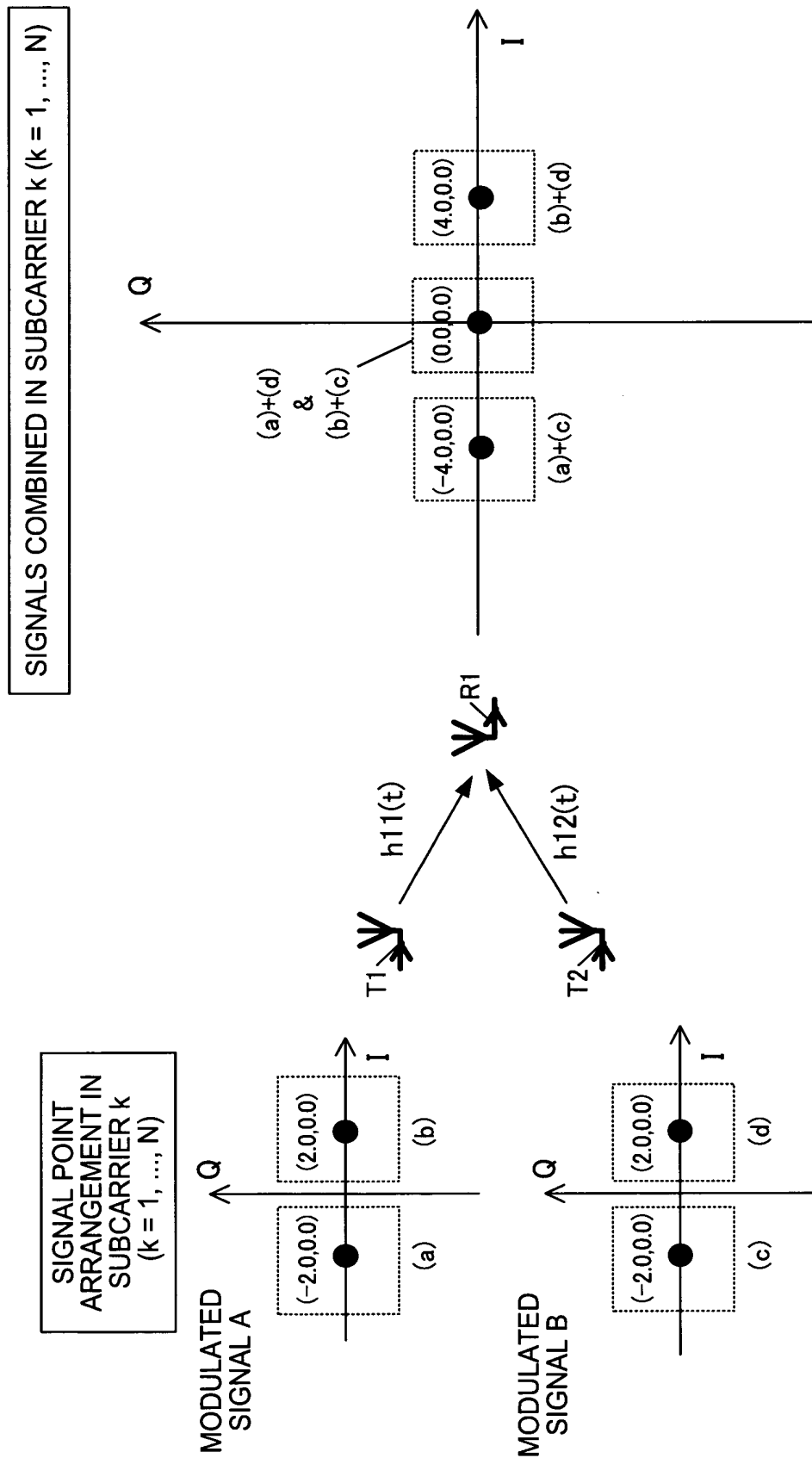


FIG.32

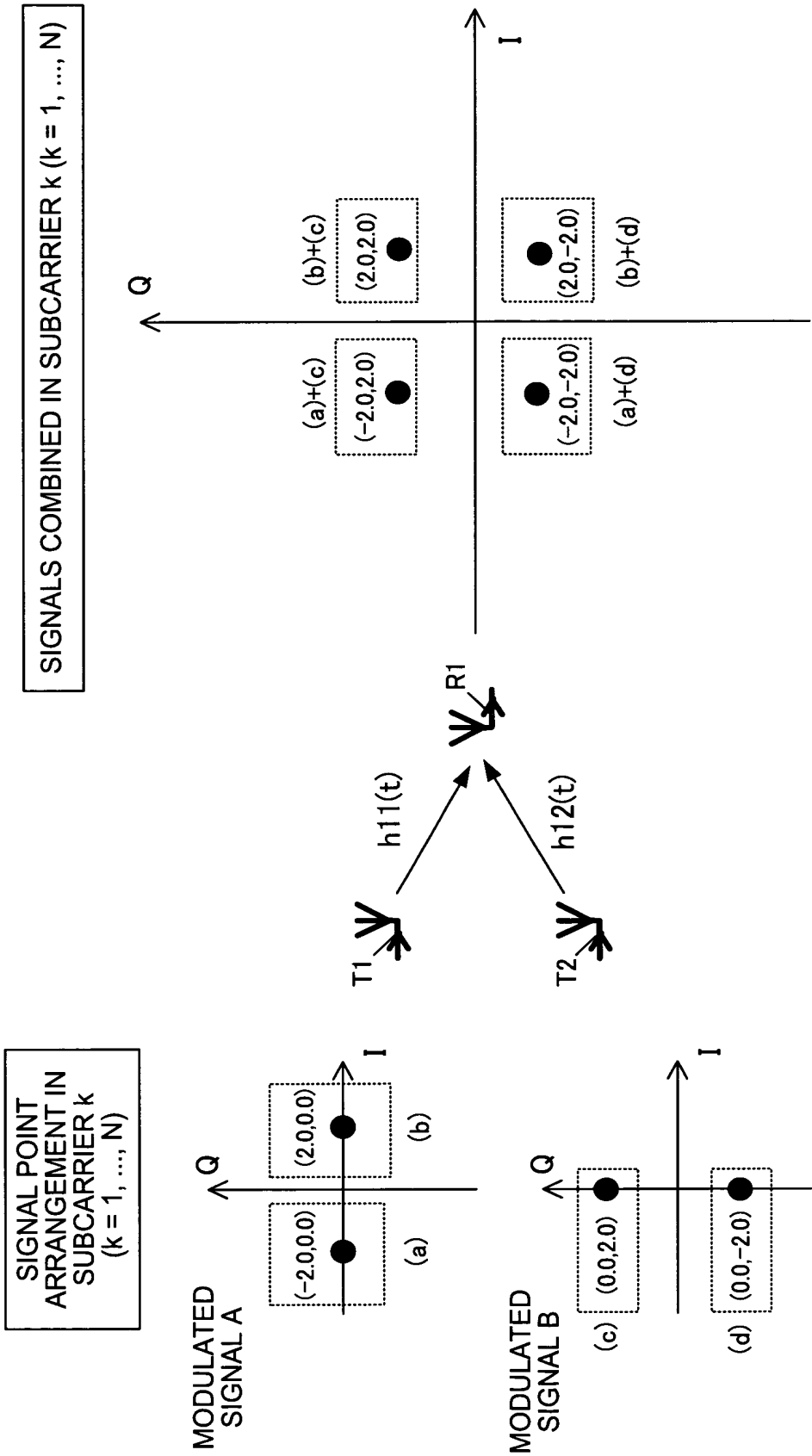


FIG.33

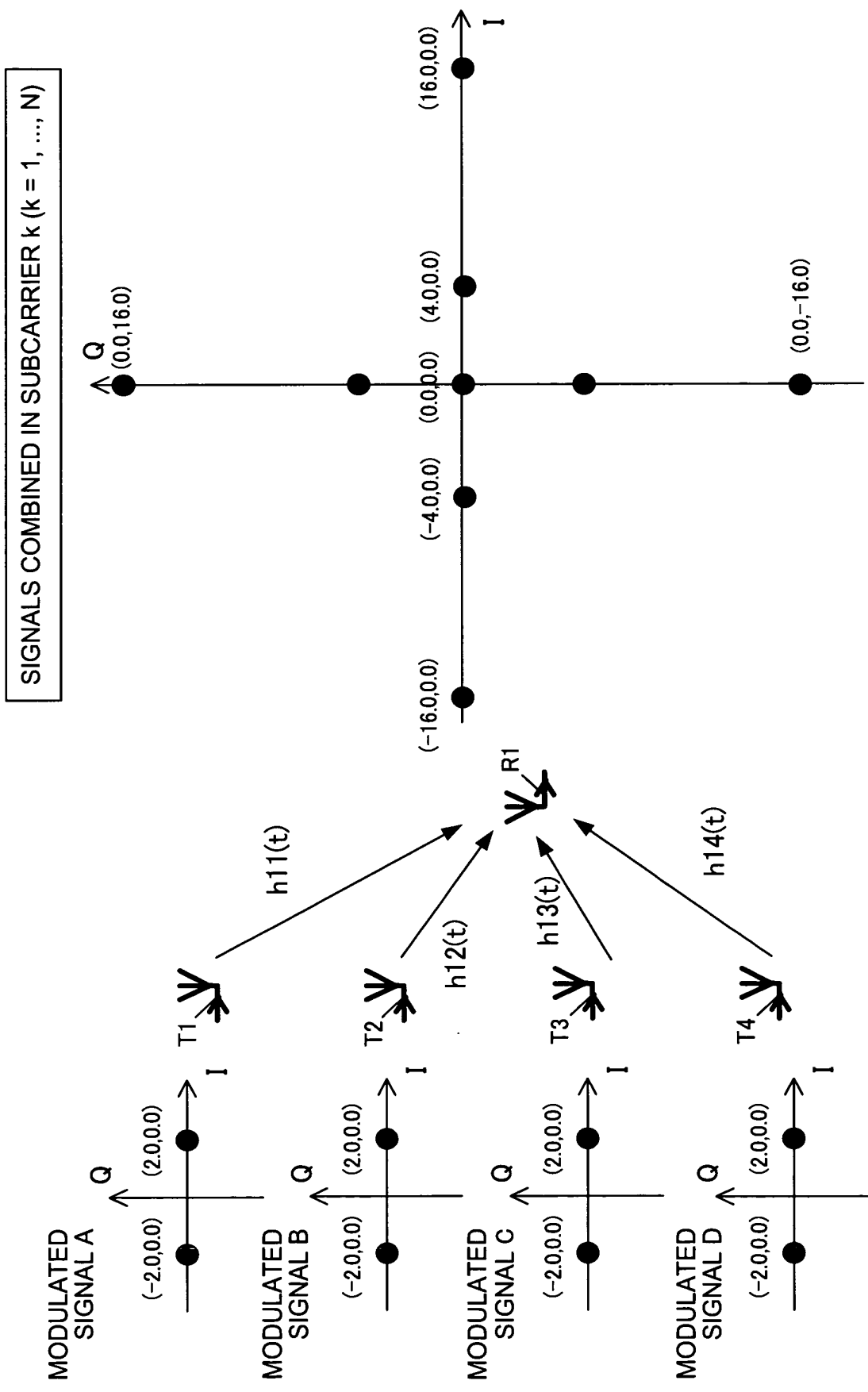


FIG.34

1 4 - 1 2

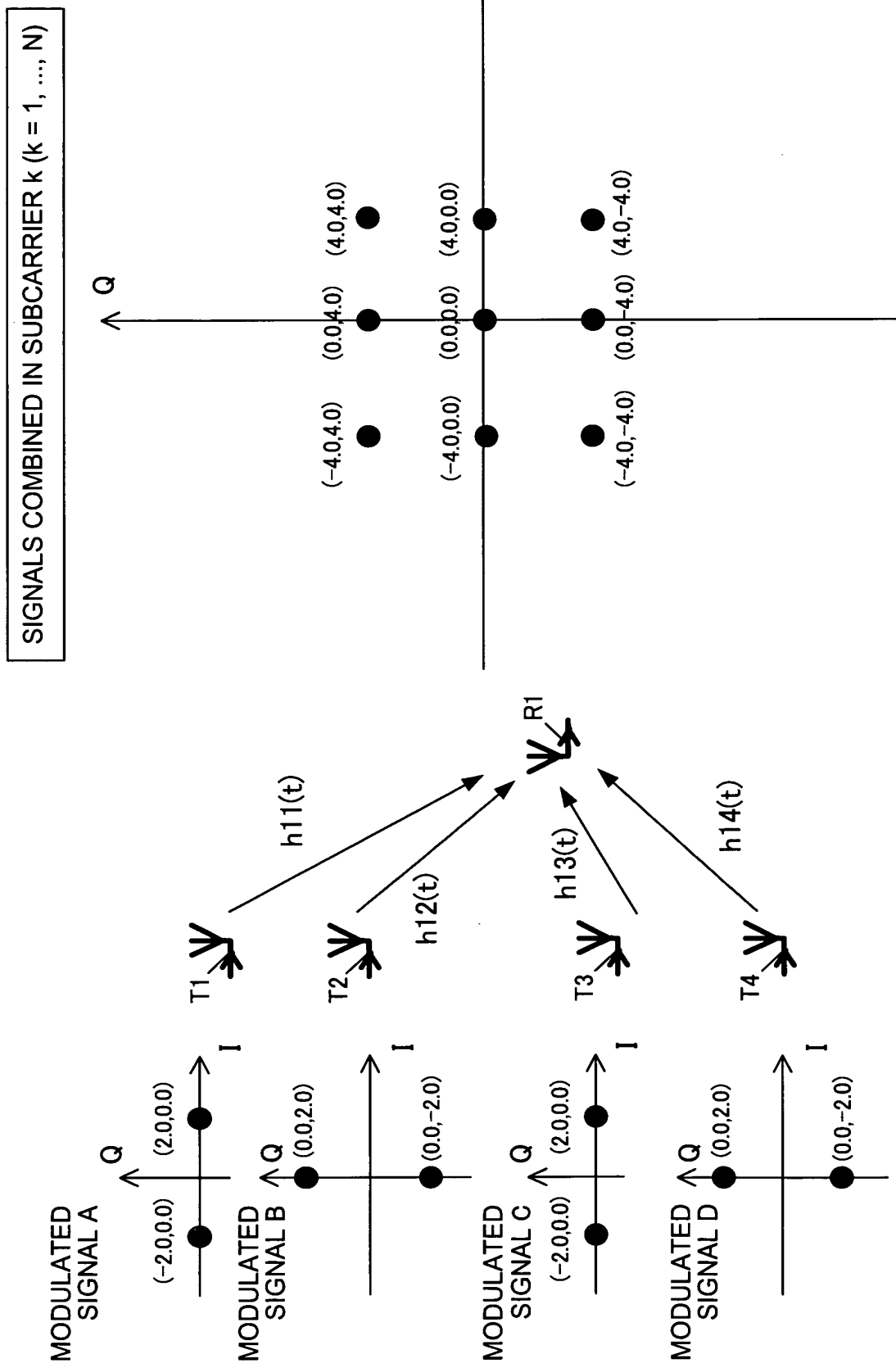


FIG.35

SIGNALS COMBINED IN SUBCARRIER  $k$  ( $k = 1, \dots, N$ )

SIGNAL POINT  
ARRANGEMENT IN  
SUBCARRIER  $k$  ( $k = 1, \dots, N$ )

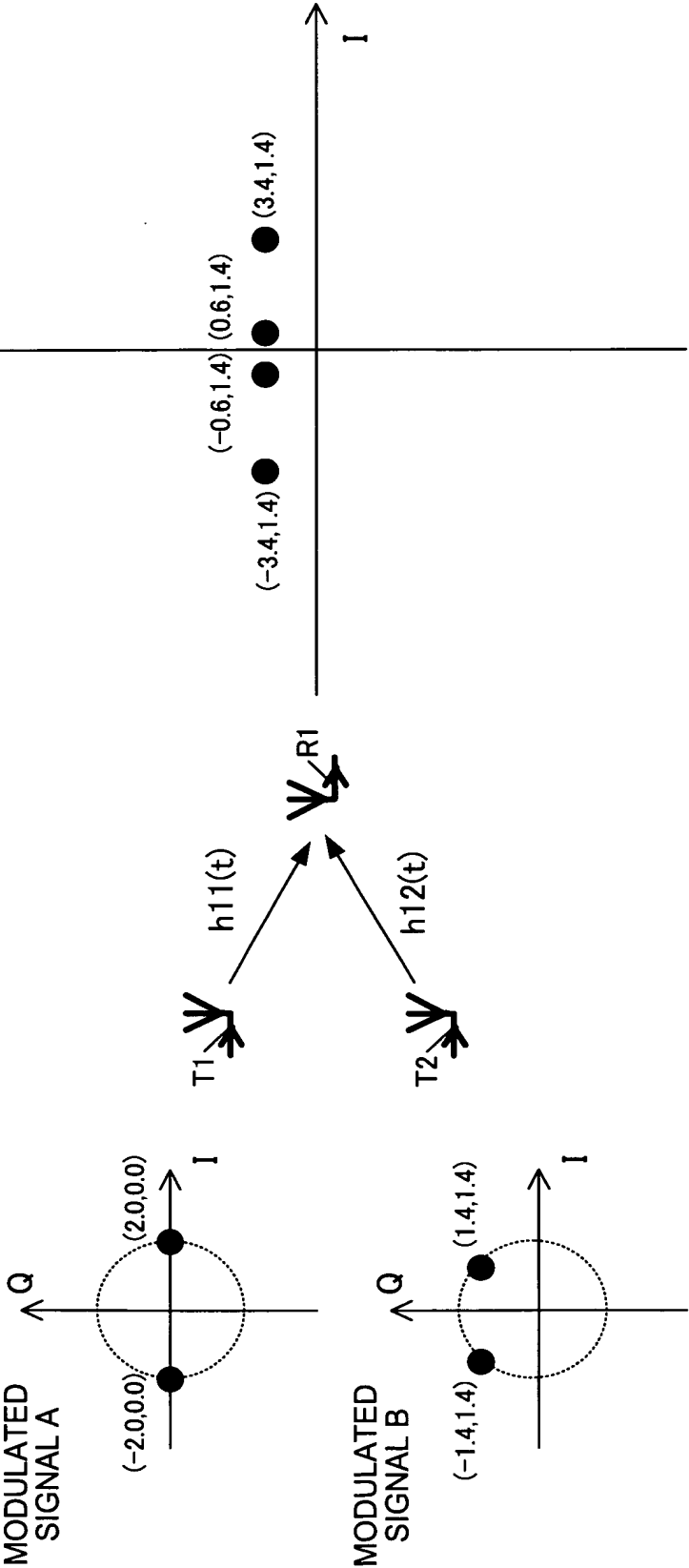


FIG.36



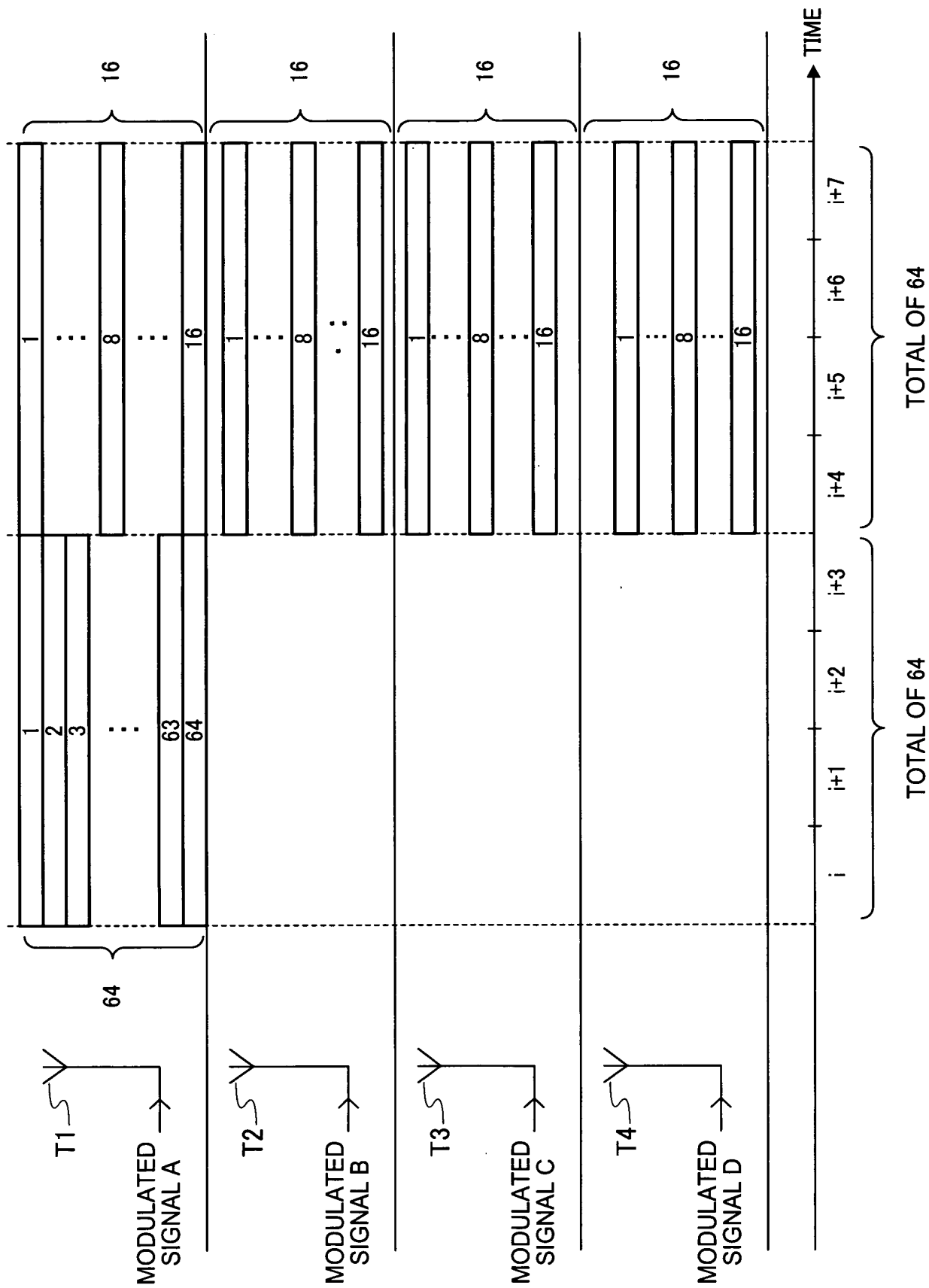


FIG.37